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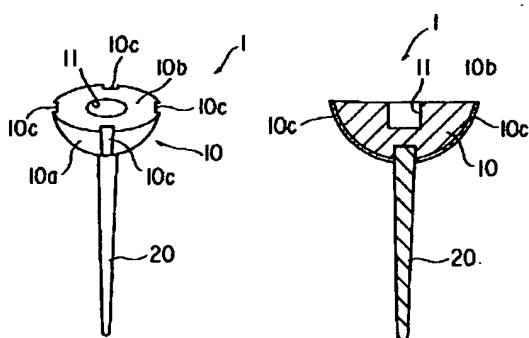
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(54)【発明の名称】スラグ除去に用いられるダーツ及びその製造方法

(57)【要約】

【課題】湯出し転炉から出鋼される鋼を無駄にしたり、  
出鋼される鋼の品質を低下させることのないダーツを提  
供することを目的とする。

【解決手段】本発明は、ヘッド10とシステム20を備  
え、湯出し転炉から鋼を出鋼する際に、出鋼孔に位置付  
けられるスラグ除去に用いられるダーツにおける前記ヘ  
ッドに、異なる比重の材料が取着可能なように比重調整  
部11を形成したことを特徴とする。



(a)

(b)

## 【特許請求の範囲】

【請求項1】 ヘッドとステムを備え、湯出し転炉から鋼を出鋼する際に出鋼孔に位置付けられるスラグ除去に用いられるダーツにおいて、

前記ヘッドは、異なる比重の材料が取着可能なように比重調整部を有していることを特徴とするダーツ。

【請求項2】 前記比重調整部は、前記ヘッドの表面部に形成される穴であり、前記異なる比重の材料は、前記穴に充填されることを特徴とする請求項1に記載のダーツ。

【請求項3】 前記穴はヘッドの中央部に形成されており、この穴の底部には前記ステムの端面に突出形成されたシャフトが挿通される挿通孔が穿設されていることを特徴とする請求項2に記載のダーツ。

【請求項4】 前記ヘッドは、複数の分割部を一体化することで形成されていることを特徴とする請求項1乃至3のいずれかの1に記載のダーツ。

【請求項5】 ダーツヘッドの下部表面を規定する離金型にヘッド形成材料を充填した後、ヘッド表面に凹所を形成すべく凸部を有する離金型でプレスする工程と、前記離金型を外して得られた成形品の凹所に、所定の比重を有する比重調整材を充填する工程と、を有することを特徴とするダーツの製造方法。

【請求項6】 前記凸部はヘッド表面の中央部に対応して形成されており、前記比重調整材を充填する前にヘッド裏面側から前記凹所に穿孔を形成する工程と、この穿孔に対し、ヘッド下部側から、ステムの端面に突出形成された突出部を挿通すると共に、前記ステム端面をヘッドの下部表面に当て付ける工程とをさらに備えており、前記比重調整材の充填は、前記突出部が挿通されている凹所に対して行われることを特徴とする請求項5に記載のダーツの製造方法。

【請求項7】 前記比重調整材を充填する前に、前記突出部と凹所の内面との間に、ステムの振れを防止する部材を取り付けることを特徴とする請求項6に記載のダーツの製造方法。

【請求項8】 ダーツヘッドの下部表面を規定する金型に所定の比重を有するヘッド形成材料を充填した後、開放側から加圧成形してヘッドを形成する工程と、前記金型を外して得られたヘッドにステムを装着する工程とを有することを特徴とするダーツの製造方法。

【請求項9】 前記ヘッドを形成する工程は、前記金型の中央部に着脱可能な芯棒を取り付けた状態で前記ヘッド形成材料を充填し、その後、芯棒を取り外すことでステムが装着可能な孔を形成する工程を有していることを特徴とする請求項8に記載のダーツの製造方法。

【請求項10】 湯出し転炉からの出鋼工程において、湯出し転炉の出鋼孔にダーツを投入する際に、そのダーツのヘッドをスラグの比重と略同様な比重にして、前記出鋼孔にそのようなヘッドを有するダーツを投入するこ

とを特徴とする湯出し転炉から鋼を出鋼する方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、湯出し転炉から鋼を出鋼する方法に関し、詳細には、湯出し転炉から鋼を出鋼する際に、転炉の出鋼孔に投下されるスラグ除去部材（ダーツ）及びその製造方法に関する。

## 【0002】

【従来の技術】従来、製鉄所における製鋼工程において、湯出し転炉内で精練された鋼を、湯出し転炉を傾けて側面に形成された出鋼孔から取出す技術が知られている。この場合、湯出し転炉内での製鋼工程においてスラグが生じており、このスラグも一緒に出鋼してしまうと、最終製品の品質の低下につながってしまう。このため、上記した出鋼の際には、浮遊しているスラグを取り除くように、傾けられた湯出し転炉の出鋼孔に、スラグ除去部材を投下することが行われている。

【0003】このスラグ除去部材は、出鋼孔を閉塞するヘッドと、出鋼孔に挿通されるステムから構成されており（その形状から「ダーツ」と称せられている）、ヘッドはスラグと略同様の比重を有する材料によって構成されている。このため、出鋼の際にステムを出鋼孔に位置付けて投下しておくことで、ヘッドは、鋼の出鋼に伴い徐々に沈下し、鋼に浮遊するスラグが出鋼孔から流出する前に出鋼孔を閉塞することとなり、これにより、スラグの流出が防止され、純度の高い鋼のみの取出しが可能となる。

## 【0004】

【発明が解決しようとする課題】通常、上記したダーツのヘッド部分は、製鋼工程において生じるであろうスラグと同等な比重を有する材料（クロム鉱石、又は鋼片を包み込んだ耐火物材料等）によって一体的に形成されているが、製鋼工程における各種条件によっては、通常用いられているダーツでは、比重が重すぎたり、あるいは軽すぎたりする、という問題がある。すなわち、スラグに対してダーツのヘッドの比重が軽いと、鋼とともにスラグも出鋼して品質の低下が生じてしまい、逆にダーツのヘッドの比重が重いと、鋼が全部出鋼し終わる前に出鋼孔が閉塞されることから無駄が生じてしまう。

【0005】従来のダーツは、製鋼工程において実際に生じるスラグとは関係なく、画一的に形成されており、上記したような品質の低下、使用可能な鋼の無駄という問題が生じている。

【0006】この発明は、湯出し転炉から出鋼される鋼を無駄にしたり、出鋼される鋼の品質を低下させることのない出鋼方法、並びにその出鋼に際して用いられるダーツ及びそのようなダーツを容易に製造できる方法を提供することを目的とする。

## 【0007】

【課題を解決するための手段】上記した課題を解決する

ために、本発明は、ヘッドとシステムを備え、湯出し転炉から鋼を出鋼する際に、出鋼孔に位置付けられるスラグ除去用に用いられるダーツにおいて、前記ヘッドに、異なる比重の材料が取着可能なように比重調整部を設けたことを特徴とする。

【0008】湯出し転炉における製鋼工程では、各種条件によって製鋼中に浮遊するスラグの比重は異なる。上記のように、ダーツのヘッドの比重調整部に、ヘッドの比重がスラグの比重と略同程度となるように望ましい比重の調整部材を取着し、これを出鋼孔に投下することで、精錬された鋼に浮遊する様々な比重のスラグの除去が可能となる。

【0009】また、上記したダーツを容易に製造するように、本発明のダーツ製造方法は、ダーツヘッドの下部表面を規定する雄金型にヘッド形成材料を充填した後、ヘッド表面に凹所を形成すべく凸部を有する雄金型でプレスする工程と、前記両金型を外して得られた成形品の凹所に、所定の比重を有する比重調整材を充填する工程とを有することを特徴とする。

【0010】このように、ダーツのヘッドを成形する際に、予め凹部を形成しておき、ここに比重の異なる材料を充填できるように構成することで、ヘッドの比重が異なるダーツを容易に製造することが可能となる。

【0011】また、本発明のダーツ製造方法は、ダーツヘッドの下部表面を規定する雄金型の中央部に着脱可能な芯棒を取り付け、ここに所定の比重を有するヘッド形成材料を充填した後、開放側から加圧成形する工程と、前記金型を外して得られた成形品から前記芯棒を取り外し、システム装着用の貫通孔を形成する工程とを有することを特徴とする。

【0012】このように、ダーツヘッドの下部表面を規定する雄金型の中央部に予め芯棒を配しておき、ここに所望の比重を有する材料を充填してプレス成形した後、ヘッド部分の芯棒を抜くことによって、抜いた部分にシステムを装着し易くなり、比重の異なるヘッドを有するダーツを容易に製造することが可能となる。

【0013】さらに、本発明は、湯出し転炉からの出鋼工程において、湯出し転炉の出鋼孔にダーツを投入する際に、そのダーツのヘッドをスラグの比重と略同様な比重にして、前記出鋼孔にそのようなヘッドを有するダーツを投入することを特徴とする。

【0014】このように、湯出し転炉から鋼を出鋼する際に、実際に生じているスラグに応じたダーツを投入することで、高品質の鋼を効率良く取出すことが可能となる。

【0015】

【発明の実施の形態】以下、本発明の好ましい実施の形態について、添付図面を参照しながら具体的に説明する。

【0016】図1は、本発明に係るダーツの一実施の形

態を示しており、(a)は斜視図、(b)はダーツ中央の縦断面図である。

【0017】ダーツ1は、略半球形状のヘッド10と、ヘッド10の下面10aの中央部に下方に向けて延出するように固定されるシステム20によって構成されている。ダーツ1は、上述したように、湯出し転炉を傾けて鋼を出鋼する際、出鋼孔に位置付けられて投下されるものであり、システム20が出鋼孔に位置付けられることでダーツの移動が規制され、鋼の流出と共にヘッド10が徐々に沈下して行き、最終的にヘッド10の下面10aによって出鋼孔が閉塞される。この場合、ヘッド10の基本材料は、湯出し転炉内の製鋼工程で生じるスラグの比重と略等しい材料、例えば鉄鉱石、鉄鋼片、鉄鋼粒、鉄合金等が混合された耐火物材料等によって形成されている。また、ヘッド10の下面10aには所定間隔を置いて外周に沿って上下方向に延出するスリット10cを複数形成しておくことが望ましい。このようなスリット10cを多数形成しておくことで、鋼の流出を円滑に行うことができる。

【0018】ヘッド10の表面10bの中央には、比重調整部(この実施の形態では筒状の凹部11)が予め形成されており、この凹部11に対して、ヘッド10の構成材料とは異なる比重の材料(比重調整部材)が充填されるようになっている。この比重調整材としては、実際に浮遊するスラグの比重よりも軽い材料、又は重い材料が適宜用いられる。すなわち、実際に浮遊するスラグの比重がヘッド10の構成材料より重いときは、ヘッド10が浮いてしまうため、そのスラグよりも比重が重い材料を充填してヘッド10を沈める。逆に、実際に浮遊するスラグの比重がヘッド10の構成材料より軽いときは、ヘッド10が沈んでしまうため、そのスラグよりも比重が軽い材料を充填してヘッド10を浮かせる。

【0019】このように、製鋼工程において、実際に浮遊するスラグに応じてヘッド10の比重が調整できるため、出鋼された鋼に不純物(スラグ)が混じることが防止でき、あるいは、無駄無く純粋の鋼のみを取出すことが可能となる。なお、比重調整材は、図1(a)に示すようなヘッドに凹部11が形成されたダーツを準備しておき、ダーツ投入工程時に、ヘッド10の比重調整部(凹部11)に最適な比重調整材を充填しても良いし、あるいは異なる比重調整材がヘッドの凹部11に予め充填されたダーツを多數準備しておき、ダーツ投入工程時に最適なダーツを選択して投入するようにしても良い。また、比重調整部は、その表面10bの中央に单一の凹部11として形成したが、凹部が形成される位置、その数や構成については、適宜変更することができ、図に示す構成に限定されることはない。あるいは、比重調整部は、図に示す凹部以外にも、比重調整材が外表面に取着できるような構成であっても良い。

【0020】図2は、図1に示したダーツ(ヘッドに予

め比重調整材が装填されているダーツ)を製造する方法の一例を示す図である。

【0021】図2(a)に示すように、略半球形状を有するダーツのヘッド10の底面領域10aを規定する雄金型30と、後述するステムの取着に適した凹所が形成されるように凸部32aを有する底型32が準備され、ここにヘッド10を形成する材料(鉄鉱石、鉄鋼片、鉄鋼粒、鉄合金等が混合された耐火物材料)等を充填する。そして、表面側から、凹部を形成する凸部35a、35bを有する成形押型35で押圧した後、これら金型を矢印方向に外すことで、図2(b)に示すように、ヘッド10が形成される。なお、上記した成形押型35及び底型32に形成されている凸部35a、35b及び32aにより、成形されたヘッド10には、それに応じて凹所11a、11b及び12が形成される。

【0022】上記した金型によって形成されたヘッド10は、両面側に形成された凹部11a、12が薄肉厚部10dによって仕切られており、この薄肉厚部10dに、図2(c)で示すように貫通孔15を穿設する。そして、裏面側から、図2(d)に示すように、ステム20の取付を行う。ステム20は、下方に延出するとともに、その上端面に、前記貫通孔15に挿通されるシャフト20aが突出形成されており、このシャフト20aが挿通された状態で、ステム20の上端面は、凹所12の底面に当て付けられる。

【0023】この状態で、凹所11(11a、11b)には、図2(f)に示すように、ヘッド10の材料の比重とは異なる比重を有する比重調整材40が充填され、ステム20が固定される。なお、比重調整材40の充填に際しては、図2(e)に示すように、シャフト20aと凹所11bの内周面との間に、シャフト固定部材38を配しておくことにより、ステムのふらつきを抑えた状態で比重調整材の充填が可能となる。また、比重調整材40を充填した後は、カバー42によって、比重調整材40を閉塞しておくことが望ましい。なお、比重調整材40としては、比重が比較的軽い材料としてクロム鉱石、鉄鉱石等を用いることができ、比重が比較的重い材料として鉄鋼片、鉄鋼粒、鉄合金等を用いることができる。

【0024】以上のような構成によれば、ヘッドの凹所11に充填される比重調整材の構成材料を適宜変えることで、比重が異なるヘッドを有するダーツを、ステムを備えた状態で一体的かつ容易に作成することができる。もちろん、ステム20は比重調整材40が充填されているヘッドに対して、事後的に取着する構成であっても良い。

【0025】この結果、最適な比重のヘッドを有するダーツを選択して出鋼孔に投下することで、高品質の鋼を効率良く取出すことが可能となる。

【0026】次に、図3を参照して、ダーツの別の製造

方法について説明する。

【0027】図3(a)に示すように、略半球形状を有するダーツのヘッドの底面領域を規定する雄金型50と、雄金型50の中央に配される底型52が準備され、ここにヘッドを形成する材料(鉄鉱石、鉄鋼片、鉄鋼粒、鉄合金等が混合された耐火物材料等)55を充填する。この場合、底型52には、上方に突出するとともに、上方に向けて次第に細径化(上端領域は略同径)するシャフト52aが取り付けられており、材料55は、図3(b)に示すように、シャフト52aの上端部付近まで充填される。

【0028】そして、表面側から、シャフト52aを挿通させる孔57aを有する成形押型57で押圧して材料55を固めることによってヘッド10を形成し、図3(c)に示すように成形押型57を取り外す。その後、底型52を上方に持ち上げて底型52を外し、かつシャフト52aを外すことで(図2(d)～(f))、中央にテーパー状の貫通孔10eが形成されたヘッド10が完成する(図2(g))。この場合、シャフト52aは、予め上方に行くに従い細径化されているため、引抜きは容易に行われる。そして、このシャフトによって形成された貫通孔10eには図1に示したステム20が挿通固定される。

【0029】以上のような構成によれば、材料55を種々変更することで、ヘッド自体を、様々な比重の材料により一体成形することができ、様々な比重のヘッドを有するダーツを容易に作成することができる。なお、比重調整部材40としては、比重が比較的軽い材料としてクロム鉱石、鉄鉱石等を用いることができ、比重が比較的重い材料として鉄鋼片、鉄鋼粒、鉄合金等を用いることができる。

【0030】この結果、ヘッドの比重の異なるダーツを複数作成しておき、実際の投入工程において、最適なダーツを選択することで、高品質の鋼を効率良く取出すことが可能となる。

【0031】以上のように、様々な比重を有するヘッドを有するダーツは、ステムと一体的に、もしくはヘッドのみを一体的に作成することができるが、特に、大型のダーツを作成する場合は、図4(a)に示すように、ヘッド10を分割(分割部10p、10q)して、これらを個々に一体的に作成しておき、それぞれの分割部を図4(b)に示すように、接着等により結合させることでヘッド10を作成しても良い。各ヘッド構成部材10p、10qを作成するに際しては、夫々の構成部材には、容易に位置決めしてヘッド10が作成できるよう位置決め手段(凹部10p' とこれに嵌合する凸部10q')を形成しておくことが望ましい。

【0032】以上、比重の異なるヘッドを有するダーツの製造方法について説明したが、ダーツの製造方法については、上記実施の形態に限定されることはなく、様々

な方法によって作成することが可能である。

【0033】

【発明の効果】本発明によれば、湯出し転炉内で生じるスラグに応じて最適な比重のヘッドを有するダーツを用いることが可能となり、湯出し転炉から出鋼される鋼を無駄にしたり、出鋼される鋼の品質を低下させることがなくなる。

【図面の簡単な説明】

【図1】(a)は、転炉の出鋼孔に対して投下されるダーツの斜視図、(b)は、ダーツの縦断面図。

【図2】(a)～(f)を含み、本発明に係るダーツを

製造する方法の一例を順を追って示す図。

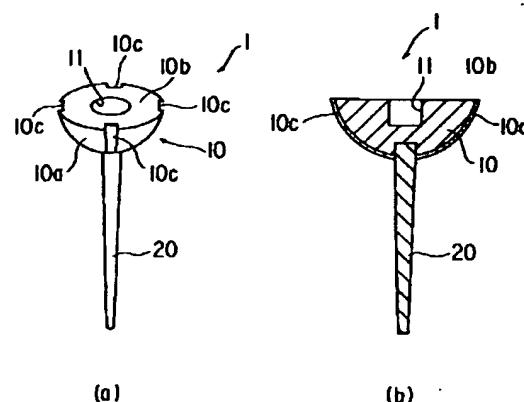
【図3】(a)～(g)を含み、本発明に係るダーツを製造する別の方法を順を追って示す図。

【図4】(a)は、分割されたダーツのヘッドを下面側から見た図、(b)は、分割されたダーツのヘッドを一体化した状態を下面側から見た図。

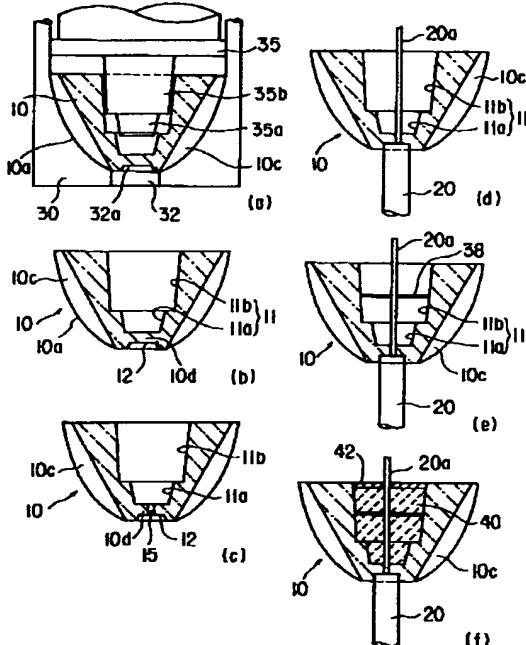
【符号の説明】

1…ダーツ、10…ヘッド、10p, 10q…分割部、  
11…凹部（比重調整部）、30, 50…錫金型、3  
10, 2, 52…底型、40…比重調整材、35, 57…成形  
押型。

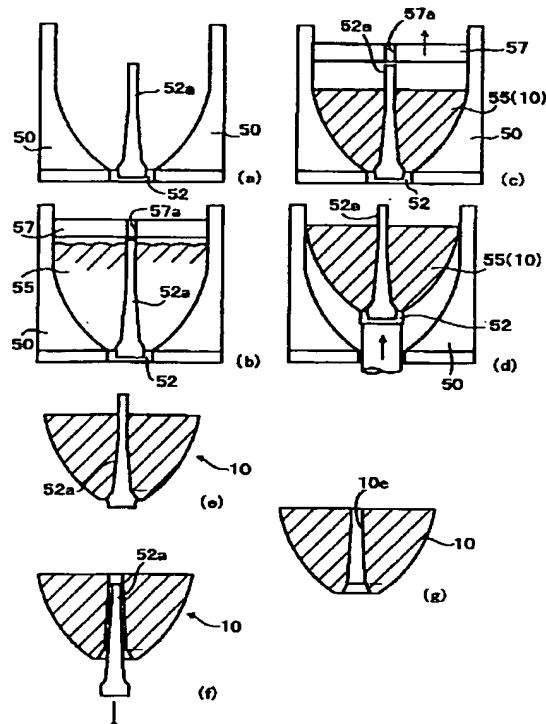
【図1】



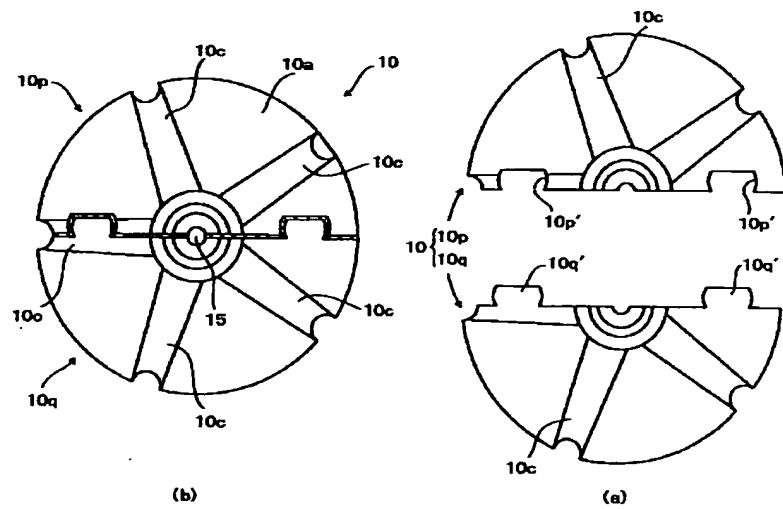
【図2】



【図3】



【図4】



## 【手続補正書】

【提出日】平成12年3月31日(2000.3.3)

1)

## 【手続補正1】

【補正対象書類名】明細書

【補正対象項目名】特許請求の範囲

【補正方法】変更

【補正内容】

## 【特許請求の範囲】

【請求項1】 ヘッドとシステムを備え、湯出し転炉から鋼を出鋼する際に出鋼孔に位置付けられるスラグ除去に用いられるダーツにおいて、

前記ヘッドは、異なる比重の材料が取着可能なように比重調整部を有し、

前記比重調整部は、前記ヘッドの表面部に形成される穴であり、前記異なる比重の材料は、前記穴に充填されることを特徴とするダーツ。

【請求項2】 前記穴はヘッドの中央部に形成されており、この穴の底部には前記システムの端面に突出形成されたシャフトが挿通される挿通孔が穿設されていることを特徴とする請求項1に記載のダーツ。

【請求項3】 前記ヘッドは、複数の分割部を一体化することで形成されていることを特徴とする請求項1または2のいずれかの1に記載のダーツ。

【請求項4】 ダーツヘッドの下部表面を規定する雄金型にヘッド形成材料を充填した後、ヘッド表面に凹所を形成すべく凸部を有する雄金型でプレスする工程と、

前記両金型を外して得られた成形品の凹所に、所定の比重を有する比重調整材を充填する工程と、を有することを特徴とするダーツの製造方法。

【請求項5】 前記凸部はヘッド表面の中央部に対応して形成されており、前記比重調整材を充填する前にヘッド裏面側から前記凹所に穿孔を形成する工程と、この穿孔に対し、ヘッド下部側から、システムの端面に突出形成された突出部を挿通すると共に、前記システム端面をヘッドの下部表面に当て付ける工程とをさらに備えており、前記比重調整材の充填は、前記突出部が挿通されている凹所に対して行われることを特徴とする請求項4に記載のダーツの製造方法。

【請求項6】 前記比重調整材を充填する前に、前記突出部と凹所の内面との間に、システムの振れを防止する部材を取り付けることを特徴とする請求項5に記載のダーツの製造方法。

【請求項7】 ダーツヘッドの下部表面を規定する金型に所定の比重を有するヘッド形成材料を充填した後、開放側から加圧成形してヘッドを形成する工程と、前記金型を外して得られたヘッドにシステムを装着する工程とを有し、

前記ヘッドを形成する工程は、前記金型の中央部に着脱可能な芯棒を取り付けた状態で前記ヘッド形成材料を充填し、その後、芯棒を取り外すことでシステムが装着可能な孔を形成する工程を有している、ことを特徴とするダーツの製造方法。

## フロントページの続き

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Fターム(参考) 4K002 BD04

4K055 AA02 JA13

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CLAIMS

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[Claim(s)]

[Claim 1] the time of having a head and a stem and carrying out tapping of the steel from a tapping converter -- tapping -- the darts characterized by having the specific-gravity-adjustment section in the darts used for the slag removal positioned in a hole so that the aforementioned head can attach the material of different specific gravity

[Claim 2] The aforementioned specific-gravity-adjustment section is a hole formed in the surface section of the aforementioned head, and the material of different specific gravity is darts according to claim 1 characterized by filling up the aforementioned hole the account of before.

[Claim 3] the insertion in which the shaft which the aforementioned hole is formed in the center section of the head, and was projected and formed in the end face of the aforementioned stem at the pars basilaris ossis occipitalis of this hole is inserted -- the darts according to claim 2 characterized by drilling the hole

[Claim 4] The aforementioned heads are darts given in 1 of the claim 1 characterized by being formed by unifying two or more division sections, or either of 3.

[Claim 5] the female which specifies the lower front face of a darts head -- the male which has heights that a hollow should be formed in a head front face after filling up metal mold with head formation material -- the process pressed with metal mold, and the above -- both -- the manufacture method of the darts characterized by having the process which fills up the hollow of the mold goods which removed metal mold and were obtained with the specific-gravity-adjustment material which has predetermined specific gravity

[Claim 6] The process which the aforementioned heights are formed corresponding to the center section on the front face of head, and forms punching in the aforementioned hollow from a head rear-face side before being filled up with the aforementioned specific-gravity-adjustment material, While inserting in the lobe projected and formed in the end face of a stem from the head lower part side to this punching It is the manufacture method of the darts according to claim 5 characterized by having further the process which shows the aforementioned stem end face to spite the lower front face of a head, and performing restoration of the aforementioned specific-gravity-adjustment material to the hollow in which the aforementioned lobe is inserted.

[Claim 7] The manufacture method of the darts according to claim 6 characterized by attaching the member which prevents the deflection of a stem between the aforementioned lobe and the inside of a hollow before being filled up with the aforementioned specific-gravity-adjustment material.

[Claim 8] the process which carries out pressing from an opening side and forms a head after filling up the metal mold which specifies the lower front face of a darts head with the head formation material which has predetermined specific gravity, and the above -- the manufacture method of the darts characterized by having the process which equips with a stem the head which removed metal mold and was obtained

[Claim 9] the process which forms the aforementioned head -- the above -- the manufacture method of the darts according to claim 8 characterized by having the process which forms the hole which can equip

with a stem by being filled up with the aforementioned head formation material where a removable arbor is attached in the center section of metal mold, and removing an arbor after that  
[Claim 10] the tapping process from a tapping converter -- setting -- tapping of a tapping converter -- the specific gravity same in case darts are supplied to a hole as the specific gravity of a slag and abbreviation of the head of the darts -- carrying out -- the aforementioned tapping -- the method of carrying out tapping of the steel from the tapping converter characterized by supplying the darts which have such a head to a hole

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] the time of this invention carrying out tapping of the steel from a tapping converter in detail about the method of carrying out tapping of the steel from a tapping converter -- tapping of a converter -- it is related with the slag-removal member (darts) dropped by the hole and its manufacture method

[0002]

[Description of the Prior Art] tapping which leaned the tapping converter and was conventionally formed in the side in the steel refined within tapping convertor in the steel-manufacture process in an iron mill -- the technology taken out from a hole is known In this case, if the slag has arisen in the steel-manufacture process within tapping convertor and tapping also of this slag is carried out together, it will lead to deterioration of the quality of a final product. for this reason, tapping of the tapping converter leaned so that the slag which is floating might be removed in the case of the above-mentioned tapping -- dropping a slag-removal member to a hole is performed

[0003] this slag-removal member -- tapping -- the head which blockades a hole, and tapping -- it consists of stems inserted in a hole (called "darts" from the configuration), and the head is constituted by the material which has the same specific gravity as a slag and abbreviation for this reason, the time of tapping -- a stem -- tapping -- the slag which a head sinks gradually in connection with tapping of steel, and floats to steel by positioning and dropping to a hole -- tapping -- before flowing out of a hole -- tapping -- a hole will be blockaded, thereby, the outflow of a slag is prevented and drawing of only steel with high purity becomes possible

[0004]

[Problem(s) to be Solved by the Invention] Usually, although the above-mentioned head portion of darts is formed in one of the material (a chrome ore or refractories material which wrapped in the slab) which has specific gravity equivalent to the \*\*\*\*\* slag produced in a steel-manufacture process, depending on the various conditions in a steel-manufacture process, for the darts usually used, its specific gravity is too heavy, or it has the problem of being too light. if tapping also of the slag will be carried out with steel if the specific gravity of the head of darts is light, deterioration of quality arises to a slag and the specific gravity of the head of darts is conversely heavy, before [ namely, ] steel will finish carrying out tapping for all -- tapping -- since a hole is blockaded, futility will arise

[0005] With the slag actually produced in a steel-manufacture process, the conventional darts are formed uniformly not related and the problem that deterioration of quality which was described above, and usable steel are useless has produced them.

[0006] Steel by which tapping is carried out from a tapping converter is made useless, or this invention aims at offering the method that the tapping method of not reducing quality of the steel by which tapping is carried out, the darts used on the occasion of the tapping, and such darts can be manufactured easily.

[0007]

[Means for Solving the Problem] the time of this invention being equipped with a head and a stem and carrying out tapping of the steel from a tapping converter, in order to solve the above-mentioned technical problem -- tapping -- in the darts used for the slag removal positioned in a hole, it is characterized by preparing the specific-gravity-adjustment section so that the material of specific gravity which is different on the aforementioned head can be attached

[0008] At the steel-manufacture process in a tapping converter, the specific gravity of the slag which floats during steel manufacture according to various conditions differs. as mentioned above, the specific-gravity-adjustment section of the head of darts -- the specific gravity of a head -- the specific gravity of a slag, and abbreviation -- it becomes of the same grade -- as -- the controller material of desirable specific gravity -- attaching -- this -- tapping -- it becomes removable [ the slag of various specific gravity which floats to the refined steel by dropping to a hole ]

[0009] moreover, the female as which the darts manufacture method of this invention specifies the lower front face of a darts head so that the above-mentioned darts may be manufactured easily -- the male which has heights that a hollow should form in a head front face after filling up metal mold with head formation material -- the process which presses with metal mold, and the above -- both -- it is characterized by to have the process which fills up the hollow of the mold goods which removed metal mold and were obtained with the specific-gravity-adjustment material which has predetermined specific gravity

[0010] Thus, in case the head of darts is fabricated, the crevice is formed beforehand and it becomes possible to manufacture easily the darts from which the specific gravity of a head differs with constituting so that it can be filled up with the material from which specific gravity differs here.

[0011] moreover, the female as which the darts manufacture method of this invention specifies the lower front face of a darts head -- the process which carries out pressing from an opening side after being filled up with the head formation material which attaches a removable arbor in the center section of metal mold, and has predetermined specific gravity here, and the above -- the aforementioned arbor removes from the mold goods which removed metal mold and were obtained, and it is characterized by to have the process which forms the breakthrough for stem wearing

[0012] thus, the female which specifies the lower front face of a darts head -- the portion extracted by allotting the arbor beforehand to the center section of metal mold, and pulling out the arbor of a head portion after filling up with and carrying out press forming of the material which has desired specific gravity here -- a stem -- equipping -- being easy -- it becomes possible to manufacture easily the darts which have the head from which specific gravity differs

[0013] furthermore, this invention -- the tapping process from a tapping converter -- setting -- tapping of a tapping converter -- the specific gravity same in case darts are supplied to a hole as the specific gravity of a slag and abbreviation of the head of the darts -- carrying out -- the aforementioned tapping -- it is characterized by supplying the darts which have such a head to a hole

[0014] Thus, in case tapping of the steel is carried out from a tapping converter, it becomes possible to take out quality steel efficiently by supplying the darts according to the actually produced slag.

[0015]

[Embodiments of the Invention] Hereafter, the gestalt of desirable operation of this invention is explained concretely, referring to an accompanying drawing.

[0016] Drawing 1 shows the gestalt of 1 operation of the darts concerning this invention, (a) is a perspective diagram and (b) is drawing of longitudinal section of the center of darts.

[0017] Darts 1 are constituted by the stem 20 fixed so that it may extend caudad towards the head 10 of an abbreviation semi-sphere configuration, and the center section of inferior-surface-of-tongue 10a of a head 10. the time of leaning a tapping converter and carrying out tapping of the steel, as darts 1 were mentioned above -- tapping -- what is positioned in a hole and dropped -- it is -- a stem 20 -- tapping -- movement of darts regulates by being positioned in a hole -- having -- defluxion of steel -- a head 10 -- gradually -- sinking -- going -- final -- inferior-surface-of-tongue 10a of a head 10 -- tapping -- a hole is blockaded In this case, the basic material of a head 10 is formed of the refractories material with which

specific gravity of a slag, abbreviation, etc. which are produced at the steel-manufacture process in tapping convertor were by carrying out, and material, for example, an iron ore, the piece of steel, the steel grain, the iron alloy, etc. were mixed. Moreover, it is desirable to form two or more slit 10c which sets a predetermined interval to inferior-surface-of-tongue 10a of a head 10, and extends in the vertical direction along with a periphery. By forming much such slit 10c, steel can be flowed out smoothly. [0018] The specific-gravity-adjustment section (crevice 11 tubed with the gestalt of this operation) is beforehand formed in the center of surface 10b of a head 10, and it fills up with the material (specific-gravity-adjustment member) of different specific gravity from the component of a head 10 to this crevice 11. A material lighter than the specific gravity of the slag which actually floats as this specific-gravity-adjustment material, or a heavy material is used suitably. That is, when the specific gravity of the slag which actually floats is heavier than the component of a head 10, in order that a head 10 may float, it is filled up with material with specific gravity heavier than the slag, and a head 10 is sunk. On the contrary, since a head 10 sinks when the specific gravity of the slag which actually floats is lighter than the component of a head 10, it is filled up with material with specific gravity lighter than the slag, and a head 10 is floated.

[0019] Thus, in a steel-manufacture process, since the specific gravity of a head 10 can be adjusted according to the slag which actually floats, it becomes possible to be able to prevent that an impurity (slag) mixes with the steel by which tapping was carried out, or to take out only pure steel [ be / no futility ]. In addition, specific-gravity-adjustment material prepares much darts with which it was loaded beforehand for the crevice 11 of a head, and specific-gravity-adjustment material which prepares the darts in which the crevice 11 was formed for the head as shown in drawing 1 (a), and may load with the optimal specific-gravity-adjustment material for the specific-gravity-adjustment section (crevice 11) of a head 10 at the time of a darts injection process, or is different chooses the darts optimal at the time of a darts injection process, and you may make it supply it. Moreover, although the specific-gravity-adjustment section was formed in the center of the surface 10b as a single crevice 11, about the position in which a crevice is formed, and its number or composition, it can be changed suitably and limited to the composition shown in drawing. Or the specific-gravity-adjustment section may be the composition which specific-gravity-adjustment material can attach in an outside surface besides the crevice shown in drawing.

[0020] Drawing 2 is drawing showing an example of a method which manufactures the darts (darts by which the head is beforehand loaded with specific-gravity-adjustment material) shown in drawing 1.

[0021] the female which specifies base field 10a of the head 10 of the darts which have an abbreviation semi-sphere configuration as shown in drawing 2 (a) -- metal mold 30 and the bottom plate 32 which has heights 32a so that the hollow suitable for attachment of the stem mentioned later may be formed are prepared, and it is filled up with the material (refractories material with which the iron ore, the piece of steel, the steel grain, the iron alloy, etc. were mixed) which forms a head 10 here. And after pressing with the forming force plunger 35 which has the heights 35a and 35b which form a crevice from a front-face side, a head 10 is formed as these metal mold is shown in drawing 2 (b) by removing in the direction of an arrow. In addition, according to it, hollows 11a, 11b, and 12 are formed in the fabricated head 10 of the heights 35a, 35b, and 32a currently formed in the above-mentioned forming force plunger 35 and the above-mentioned bottom plate 32.

[0022] The crevices 11a and 12 formed in both-sides side are divided by 10d of thin thick sections, and the head 10 formed by the above-mentioned metal mold drills a breakthrough 15 in 10d of this thin thick section, as drawing 2 (c) shows. And from a rear-face side, as shown in drawing 2 (d), a stem 20 is attached. Shaft 20a inserted in the aforementioned breakthrough 15 is projected and formed in the upper-limit side, a stem 20 is in the state where this shaft 20a was inserted in, and the upper-limit side of a stem 20 is shown on the base of a hollow 12 to spite it while it extends caudad.

[0023] In this state, as shown in drawing 2 (f), a hollow 11 (11a, 11b) is filled up with the specific-gravity-adjustment material 40 which has different specific gravity from the specific gravity of the material of a head 10, and a stem 20 is fixed to it. In addition, on the occasion of restoration of the

specific-gravity-adjustment material 40, as shown in drawing 2 (e), where wandering of a stem is stopped, restoration of specific-gravity-adjustment material is attained by allotting the shaft holddown member 38 between shaft 20a and the inner skin of hollow 11b. Moreover, after being filled up with the specific-gravity-adjustment material 40, it is desirable to blockade the specific-gravity-adjustment material 40 with covering 42. In addition, as specific-gravity-adjustment material 40, a chrome ore, an iron ore, etc. can be used as a material with comparatively light specific gravity, and the piece of steel, a steel grain, an iron alloy, etc. can be used as a material with comparatively heavy specific gravity.

[0024] It becomes possible to create one-wise and easily the darts which have the head from which specific gravity differs by changing suitably the component of the specific-gravity-adjustment material with which the hollow 11 of a head is filled up according to the above composition, where it has a stem. Of course, a stem 20 may be composition attached in after the event to the head with which the specific-gravity-adjustment material 40 is filled up.

[0025] consequently, the darts which have the head of the optimal specific gravity -- choosing -- tapping -- it becomes possible to take out quality steel efficiently by dropping to a hole

[0026] Next, the another manufacture method of darts is explained with reference to drawing 3.

[0027] the female which specifies the base field of the head of the darts which have an abbreviation semi-sphere configuration as shown in drawing 3 (a) -- metal mold 50 and a female -- the bottom plate 52 allotted in the center of metal mold 50 is prepared, and it is filled up with the material (refractories material with which the iron ore, the piece of steel, the steel grain, the iron alloy, etc. were mixed) 55 which forms a head here In this case, while projecting up, shaft 52a gradually narrow-diameter-ized towards the upper part (a upper-limit field is \*\*\*\*\*) is attached, and a bottom plate 52 is filled up with material 55 to near the upper-limit section of shaft 52a, as shown in drawing 3 (b).

[0028] and the hole in which shaft 52a is made to insert from a front-face side -- by pressing with the forming force plunger 57 which has 57a, and hardening material 55, a head 10 is formed, and as shown in drawing 3 (c), the forming force plunger 57 is removed then, the thing for which a bottom plate 52 is raised up, and a bottom plate 52 is removed, and shaft 52a is removed -- ( -- the head 10 by which taper-like breakthrough 10e was formed in drawing 2 (d) - (f) and the center is completed ( drawing 2 (g)) In this case, since shaft 52a is narrow-diameter-ized as it goes up beforehand, drawing is performed easily. And insertion fixation of the stem 20 shown in drawing 1 is carried out at breakthrough 10e formed of this shaft.

[0029] According to the above composition, the head itself can really be fabricated by the material of various specific gravity by changing material 55 variously, and the darts which have the head of various specific gravity can be easily created by it. In addition, as specific gravity controller material 40, a chrome ore, an iron ore, etc. can be used as a material with comparatively light specific gravity, and the piece of steel, a steel grain, an iron alloy, etc. can be used as a material with comparatively heavy specific gravity.

[0030] Consequently, two or more darts from which the specific gravity of a head differs are created, and it becomes possible in an actual injection process to take out quality steel efficiently by choosing the optimal darts.

[0031] As mentioned above,-like, although the darts which have the head which has various specific gravity can create only a head in one, a stem and really Especially when creating large-sized darts, as shown in drawing 4 (a), a head 10 is divided (division sections 10p and 10q), these are separately created in one, and a head 10 may be created by combining each division section by adhesion etc., as shown in drawing 4 (b). each head composition -- it is desirable to form a positioning means (crevice 10p' and heights 10q' which fits into this) so that it faces creating Members 10p and 10q, and it may position easily to each composition member and a head 10 can be created

[0032] As mentioned above, although the manufacture method of the darts which have the head from which specific gravity differs was explained, about the manufacture method of darts, it is possible for it not to be limited to the gestalt of the above-mentioned implementation, and to create by various methods.

[0033]

**[Effect of the Invention]** It becomes possible to use the darts which have the head of the optimal specific gravity according to the slag produced within tapping convertor according to this invention, and steel by which tapping is carried out from a tapping converter is made useless, or reducing the quality of the steel by which tapping is carried out is lost.

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**TECHNICAL FIELD**

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[The technical field to which invention belongs] the time of this invention carrying out tapping of the steel from a tapping converter in detail about the method of carrying out tapping of the steel from a tapping converter -- tapping of a converter -- it is related with the slag-removal member (darts) dropped by the hole and its manufacture method

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**PRIOR ART**

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[Description of the Prior Art] tapping which leaned the tapping converter and was conventionally formed in the side in the steel refined within tapping convertor in the steel-manufacture process in an iron mill -- the technology taken out from a hole is known In this case, if the slag has arisen in the steel-manufacture process within tapping convertor and tapping also of this slag is carried out together, it will lead to deterioration of the quality of a final product. for this reason, tapping of the tapping converter leaned so that the slag which is floating might be removed in the case of the above-mentioned tapping -- dropping a slag-removal member to a hole is performed

[0003] this slag-removal member -- tapping -- the head which blockades a hole, and tapping -- it consists of stems inserted in a hole (called "darts" from the configuration), and the head is constituted by the material which has the same specific gravity as a slag and abbreviation for this reason, the time of tapping -- a stem -- tapping -- the slag which a head sinks gradually in connection with tapping of steel, and floats to steel by positioning and dropping to a hole -- tapping -- before flowing out of a hole -- tapping -- a hole will be blockaded, thereby, the outflow of a slag is prevented and drawing of only steel with high purity becomes possible

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**EFFECT OF THE INVENTION**

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**[Effect of the Invention]** It becomes possible to use the darts which have the head of the optimal specific gravity according to the slag produced within tapping convertor according to this invention, and steel by which tapping is carried out from a tapping converter is made useless, or reducing the quality of the steel by which tapping is carried out is lost.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] Usually, although the above-mentioned head portion of darts is formed in one of the material (a chrome ore or refractories material which wrapped in the slab) which has specific gravity equivalent to the \*\*\*\*\* slag produced in a steel-manufacture process, depending on the various conditions in a steel-manufacture process, for the darts usually used, its specific gravity is too heavy, or it has the problem of being too light. if tapping also of the slag will be carried out with steel if the specific gravity of the head of darts is light, deterioration of quality arises to a slag and the specific gravity of the head of darts is conversely heavy, before [ namely, ] steel will finish carrying out tapping for all -- tapping -- since a hole is blockaded, futility will arise

[0005] With the slag actually produced in a steel-manufacture process, the conventional darts are formed uniformly not related and the problem that deterioration of quality which was described above, and usable steel are useless has produced them.

[0006] Steel by which tapping is carried out from a tapping converter is made useless, or this invention aims at offering the method that the tapping method of not reducing quality of the steel by which tapping is carried out, the darts used on the occasion of the tapping, and such darts can be manufactured easily.

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MEANS

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[Means for Solving the Problem] the time of this invention being equipped with a head and a stem and carrying out tapping of the steel from a tapping converter, in order to solve the above-mentioned technical problem -- tapping -- in the darts used for the slag removal positioned in a hole, it is characterized by preparing the specific-gravity-adjustment section so that the material of specific gravity which is different on the aforementioned head can be attached

[0008] At the steel-manufacture process in a tapping converter, the specific gravity of the slag which floats during steel manufacture according to various conditions differs. as mentioned above, the specific-gravity-adjustment section of the head of darts -- the specific gravity of a head -- the specific gravity of a slag, and abbreviation -- it becomes of the same grade -- as -- the controller material of desirable specific gravity -- attaching -- this -- tapping -- it becomes removable [ the slag of various specific gravity which floats to the refined steel by dropping to a hole ]

[0009] moreover, the female as which the darts manufacture method of this invention specifies the lower front face of a darts head so that the above-mentioned darts may be manufactured easily -- the male which has heights that a hollow should form in a head front face after filling up metal mold with head formation material -- the process which presses with metal mold, and the above -- both -- it is characterized by to have the process which fills up the hollow of the mold goods which removed metal mold and were obtained with the specific-gravity-adjustment material which has predetermined specific gravity

[0010] Thus, in case the head of darts is fabricated, the crevice is formed beforehand and it becomes possible to manufacture easily the darts from which the specific gravity of a head differs with constituting so that it can be filled up with the material from which specific gravity differs here.

[0011] moreover, the female as which the darts manufacture method of this invention specifies the lower front face of a darts head -- the process which carries out pressing from an opening side after being filled up with the head formation material which attaches a removable arbor in the center section of metal mold, and has predetermined specific gravity here, and the above -- the aforementioned arbor removes from the mold goods which removed metal mold and were obtained, and it is characterized by to have the process which forms the breakthrough for stem wearing

[0012] thus, the female which specifies the lower front face of a darts head -- the portion extracted by allotting the arbor beforehand to the center section of metal mold, and pulling out the arbor of a head portion after filling up with and carrying out press forming of the material which has desired specific gravity here -- a stem -- equipping -- being easy -- it becomes possible to manufacture easily the darts which have the head from which specific gravity differs

[0013] furthermore, this invention -- the tapping process from a tapping converter -- setting -- tapping of a tapping converter -- the specific gravity same in case darts are supplied to a hole as the specific gravity of a slag and abbreviation of the head of the darts -- carrying out -- the aforementioned tapping -- it is characterized by supplying the darts which have such a head to a hole

[0014] Thus, in case tapping of the steel is carried out from a tapping converter, it becomes possible to

take out quality steel efficiently by supplying the darts according to the actually produced slag.

[0015]

[Embodiments of the Invention] Hereafter, the gestalt of desirable operation of this invention is explained concretely, referring to an accompanying drawing.

[0016] Drawing 1 shows the gestalt of 1 operation of the darts concerning this invention, (a) is a perspective diagram and (b) is drawing of longitudinal section of the center of darts.

[0017] Darts 1 are constituted by the stem 20 fixed so that it may extend caudad towards the head 10 of an abbreviation semi-sphere configuration, and the center section of inferior-surface-of-tongue 10a of a head 10. the time of leaning a tapping converter and carrying out tapping of the steel, as darts 1 were mentioned above -- tapping -- what is positioned in a hole and dropped -- it is -- a stem 20 -- tapping -- movement of darts regulates by being positioned in a hole -- having -- defluxion of steel -- a head 10 -- gradually -- sinking -- going -- final -- inferior-surface-of-tongue 10a of a head 10 -- tapping -- a hole is blockaded In this case, the basic material of a head 10 is formed of the refractories material with which specific gravity of a slag, abbreviation, etc. which are produced at the steel-manufacture process in tapping convertor were by carrying out, and material, for example, an iron ore, the piece of steel, the steel grain, the iron alloy, etc. were mixed. Moreover, it is desirable to form two or more slit 10c which sets a predetermined interval to inferior-surface-of-tongue 10a of a head 10, and extends in the vertical direction along with a periphery. By forming much such slit 10c, steel can be flowed out smoothly.

[0018] The specific-gravity-adjustment section (crevice 11 tubed with the gestalt of this operation) is beforehand formed in the center of surface 10b of a head 10, and it fills up with the material (specific-gravity-adjustment member) of different specific gravity from the component of a head 10 to this crevice 11. A material lighter than the specific gravity of the slag which actually floats as this specific-gravity-adjustment material, or a heavy material is used suitably. That is, when the specific gravity of the slag which actually floats is heavier than the component of a head 10, in order that a head 10 may float, it is filled up with material with specific gravity heavier than the slag, and a head 10 is sunk. On the contrary, since a head 10 sinks when the specific gravity of the slag which actually floats is lighter than the component of a head 10, it is filled up with material with specific gravity lighter than the slag, and a head 10 is floated.

[0019] Thus, in a steel-manufacture process, since the specific gravity of a head 10 can be adjusted according to the slag which actually floats, it becomes possible to be able to prevent that an impurity (slag) mixes with the steel by which tapping was carried out, or to take out only pure steel [ be / no futility ]. In addition, specific-gravity-adjustment material prepares much darts with which it was loaded beforehand for the crevice 11 of a head, and specific-gravity-adjustment material which prepares the darts in which the crevice 11 was formed for the head as shown in drawing 1 (a), and may load with the optimal specific-gravity-adjustment material for the specific-gravity-adjustment section (crevice 11) of a head 10 at the time of a darts injection process, or is different chooses the darts optimal at the time of a darts injection process, and you may make it supply it. Moreover, although the specific-gravity-adjustment section was formed in the center of the surface 10b as a single crevice 11, about the position in which a crevice is formed, and its number or composition, it can be changed suitably and limited to the composition shown in drawing. Or the specific-gravity-adjustment section may be the composition which specific-gravity-adjustment material can attach in an outside surface besides the crevice shown in drawing.

[0020] Drawing 2 is drawing showing an example of a method which manufactures the darts (darts by which the head is beforehand loaded with specific-gravity-adjustment material) shown in drawing 1 .

[0021] the female which specifies base field 10a of the head 10 of the darts which have an abbreviation semi-sphere configuration as shown in drawing 2 (a) -- metal mold 30 and the bottom plate 32 which has heights 32a so that the hollow suitable for attachment of the stem mentioned later may be formed are prepared, and it is filled up with the material (refractories material with which the iron ore, the piece of steel, the steel grain, the iron alloy, etc. were mixed) which forms a head 10 here And after pressing with the forming force plunger 35 which has the heights 35a and 35b which form a crevice from a front-face

side, a head 10 is formed as these metal mold is shown in drawing 2 (b) by removing in the direction of an arrow. In addition, according to it, hollows 11a, 11b, and 12 are formed in the fabricated head 10 of the heights 35a, 35b, and 32a currently formed in the above-mentioned forming force plunger 35 and the above-mentioned bottom plate 32.

[0022] The crevices 11a and 12 formed in both-sides side are divided by 10d of thin thick sections, and the head 10 formed by the above-mentioned metal mold drills a breakthrough 15 in 10d of this thin thick section, as drawing 2 (c) shows. And from a rear-face side, as shown in drawing 2 (d), a stem 20 is attached. Shaft 20a inserted in the aforementioned breakthrough 15 is projected and formed in the upper-limit side, a stem 20 is in the state where this shaft 20a was inserted in, and the upper-limit side of a stem 20 is shown on the base of a hollow 12 to spite it while it extends below.

[0023] In this state, as shown in drawing 2 (f), a hollow 11 (11a, 11b) is filled up with the specific-gravity-adjustment material 40 which has different specific gravity from the specific gravity of the material of a head 10, and a stem 20 is fixed to it. In addition, on the occasion of restoration of the specific-gravity-adjustment material 40, as shown in drawing 2 (e), where wandering of a stem is stopped, restoration of specific-gravity-adjustment material is attained by allotting the shaft holddown member 38 between shaft 20a and the inner skin of hollow 11b. Moreover, after being filled up with the specific-gravity-adjustment material 40, it is desirable to blockade the specific-gravity-adjustment material 40 with covering 42. In addition, as specific-gravity-adjustment material 40, a chrome ore, an iron ore, etc. can be used as a material with comparatively light specific gravity, and the piece of steel, a steel grain, an iron alloy, etc. can be used as a material with comparatively heavy specific gravity.

[0024] It becomes possible to create one-wise and easily the darts which have the head from which specific gravity differs by changing suitably the component of the specific-gravity-adjustment material with which the hollow 11 of a head is filled up according to the above composition, where it has a stem. Of course, a stem 20 may be composition attached in after the event to the head with which the specific-gravity-adjustment material 40 is filled up.

[0025] consequently, the darts which have the head of the optimal specific gravity -- choosing -- tapping -- it becomes possible to take out quality steel efficiently by dropping to a hole

[0026] Next, the another manufacture method of darts is explained with reference to drawing 3.

[0027] the female which specifies the base field of the head of the darts which have an abbreviation semi-sphere configuration as shown in drawing 3 (a) -- metal mold 50 and a female -- the bottom plate 52 allotted in the center of metal mold 50 is prepared, and it is filled up with the material (refractories material with which the iron ore, the piece of steel, the steel grain, the iron alloy, etc. were mixed) 55 which forms a head here In this case, while projecting up, shaft 52a gradually narrow-diameter-ized towards the upper part (a upper-limit field is \*\*\*\*\*) is attached, and a bottom plate 52 is filled up with material 55 to near the upper-limit section of shaft 52a, as shown in drawing 3 (b).

[0028] and the hole in which shaft 52a is made to insert from a front-face side -- by pressing with the forming force plunger 57 which has 57a, and hardening material 55, a head 10 is formed, and as shown in drawing 3 (c), the forming force plunger 57 is removed then, the thing for which a bottom plate 52 is raised up, and a bottom plate 52 is removed, and shaft 52a is removed -- (the head 10 by which taper-like breakthrough 10e was formed in drawing 2 (d) - (f)) and the center is completed ( drawing 2 (g)) In this case, since shaft 52a is narrow-diameter-ized as it goes up beforehand, drawing is performed easily. And insertion fixation of the stem 20 shown in drawing 1 is carried out at breakthrough 10e formed of this shaft.

[0029] According to the above composition, the head itself can really be fabricated by the material of various specific gravity by changing material 55 variously, and the darts which have the head of various specific gravity can be easily created by it. In addition, as specific gravity controller material 40, a chrome ore, an iron ore, etc. can be used as a material with comparatively light specific gravity, and the piece of steel, a steel grain, an iron alloy, etc. can be used as a material with comparatively heavy specific gravity.

[0030] Consequently, two or more darts from which the specific gravity of a head differs are created, and it becomes possible in an actual injection process to take out quality steel efficiently by choosing the

optimal darts.

[0031] As mentioned above, -like, although the darts which have the head which has various specific gravity can create only a head in one, a stem and really Especially when creating large-sized darts, as shown in drawing 4 (a), a head 10 is divided (division sections 10p and 10q), these are separately created in one, and a head 10 may be created by combining each division section by adhesion etc., as shown in drawing 4 (b). each head composition -- it is desirable to form a positioning means (crevice 10p' and heights 10q' which fits into this) so that it faces creating Members 10p and 10q, and it may position easily to each composition member and a head 10 can be created

[0032] As mentioned above, although the manufacture method of the darts which have the head from which specific gravity differs was explained, about the manufacture method of darts, it is possible for it not to be limited to the gestalt of the above-mentioned implementation, and to create by various methods.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] (a) -- tapping of a converter -- the perspective diagram of the darts dropped to a hole, and (b) -- drawing of longitudinal section of darts

[Drawing 2] (a) Drawing showing order for an example of a method which manufactures the darts concerning this invention including - (f) later on.

[Drawing 3] (a) Drawing showing order for the option which manufactures the darts concerning this invention including - (g) later on.

[Drawing 4] For (a), drawing which looked at the head of the divided darts from the inferior-surface-of-tongue side, and (b) are drawing which looked at the state where the head of the divided darts was unified, from the inferior-surface-of-tongue side.

[Description of Notations]

1 -- darts, 10 -- head, 10p, and 10q -- the division section, 11 -- crevice (specific-gravity-adjustment section), 30, and 50 -- female -- metal mold, 32, and 52 -- a bottom plate, 40 -- specific-gravity-adjustment material, 35, and 57 -- fabrication force plunger

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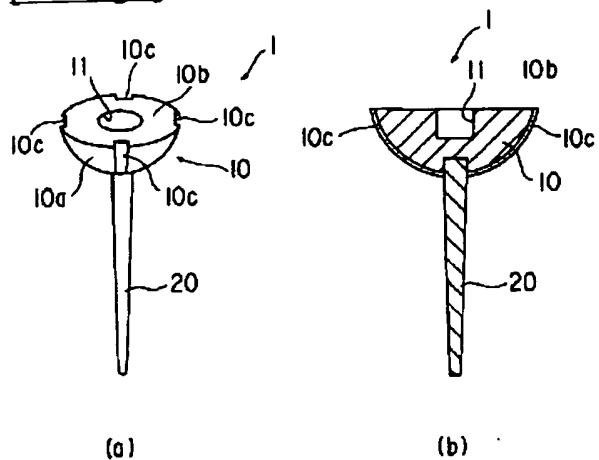
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DRAWINGS

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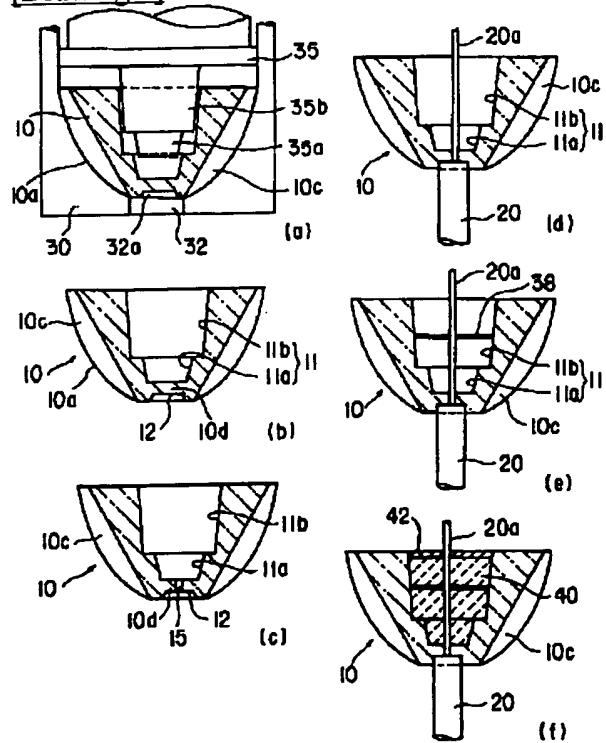
[Drawing 1]



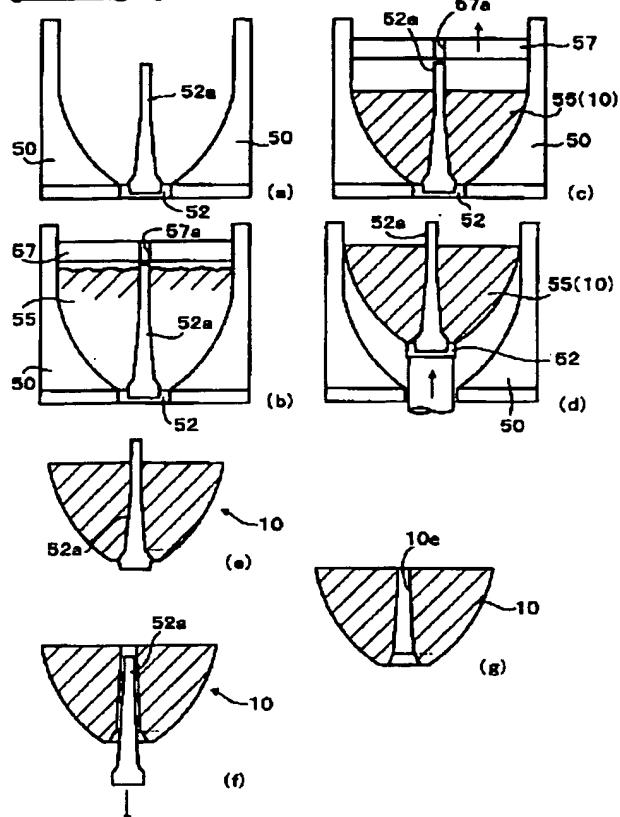
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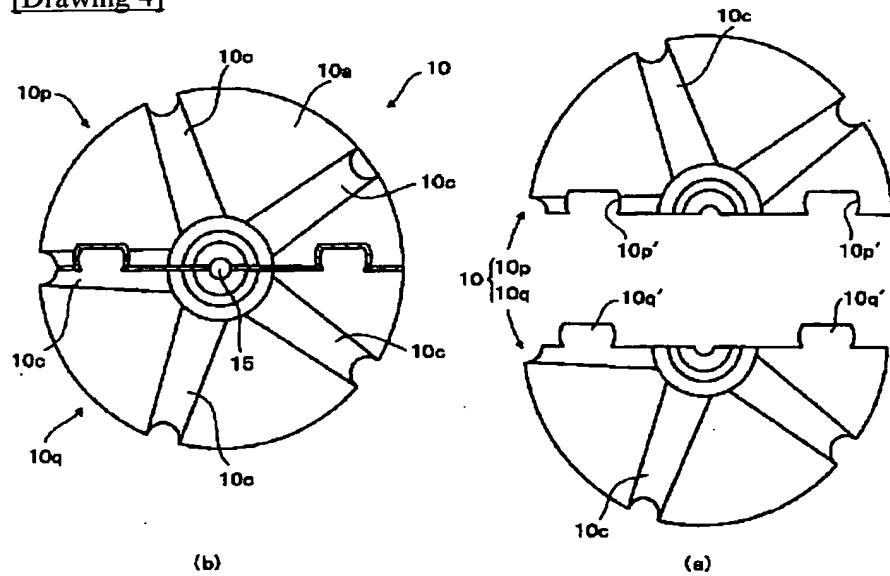
[Drawing 2]



[Drawing 3]



[Drawing 4]



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